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10/536,599	07/19/2005	Yasuhiro Watanabe	3712174.00456	9306

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K&L Gates LLP
P. O. BOX 1135
CHICAGO, IL 60690

EXAMINER	
WANG, EUGENIA	
ART UNIT	**PAPER NUMBER**
1726	

NOTIFICATION DATE	DELIVERY MODE
06/07/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

chicago.patents@klgates.com

Office Action Summary	Application No.	Applicant(s)	
	10/536,599	WATANABE ET AL.	
	Examiner	Art Unit	
	EUGENIA WANG	1726	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *42-44,46-56 and 60-88* is/are pending in the application.

4a) Of the above claim(s) *64-80 and 82* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *42-44,46-56,60-63,81 and 83-85* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/24/11*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received May 24, 2011:

   a. Claims 87-88 have been added. Claims 42-44, 46-56, 60-88 are pending with claims 64-80 and 82 being withdrawn as being drawn to an unelected invention.

   b. The previous claim objections have been withdrawn in light of the amendment.

   c. The previous 112 rejections have been withdrawn in light of the amendment.

   d. The core of the previous prior art rejection has been maintained with slight changes in light of the amendment. All changes made are necessitated by the amendment. Thus the action is final.

Information Disclosure Statement

2. The information disclosure statements filed May 24, 2011 has been placed in the application file and the information referred to therein has been considered as to the merits (with the exception of the foreign language office action without a corresponding statement of relevancy).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 42-44, 47-52, 56, 60-62, and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/14819 (Chizawa et al.) in view of US 2002/0155333 (Fitts et al.), US 2002/0028364 (Kaufmann), US 2002/0190448 (Imamura et al.), US 2002/0168556 (Leboe et al.), and US 2003/0022042 (Wells et al.). It is noted that US 6613467 is being relied upon as an English translation of the corresponding WO document (Chizawa et al.).

As to claim 42, Chizawa et al. teach of a general fuel cell system, which has a plurality of fuel cells [4] which react electrochemically to create power (power generation units) (col. 1, lines 30-43; fig. 1). It is stated that oxygen is fed to the system (and thus some conduit containing oxygen gas must exist) (col. 1, lines 48-51). It is specifically noted that Chizawa et al. embodies such a typical fuel cell with modifications, as there is a statement as to only differences to the general fuel cell of fig. 1 will be described in their embodiments (col. 2, lines 26-28). In one particular embodiment radiation fins [16], for radiating heat to the outer atmosphere (heat radiation unit with a plurality of radiating fins and having heat transfer portions) is embodied (col. 5, lines 5-10; col. 12, lines 55-59; fig. 9). Although not specifically shown in fig. 9, Chizawa et al. teach that the cooling unit via radiating (i.e. radiating fins of fig. 9) are provided with the separator (of the fuel cell) (col. 5, lines 4-10). Accordingly, it can be interpreted that separator and cooling unit via radiating are in some manner integral, wherein a half of the fin (further away from the fuel cell portion) can be interpreted to be a heat radiation unit and half of the fin (closer to the fuel cell portion) can be interpreted to be a heat transfer portion that extends to a heat radiation unit (barring specification of there relationship between the

heat radiation unit and heat transfer portion). The fins [16] below the stack [9] are interpreted to be connected to a first side (lower half of the fuel cell system), while the fins [16] above the stack [9] are on a second side (upper half of the fuel cell system). It is noted that the system has gas-feeding means (gas flow unit) for the reactants (thus encompassing both oxidant and fuel), wherein the gas-feeding means feeds each reactant separately into the separator (col. 5, lines 5-10). It is noted that the oxidant gas (air embodied) is necessarily fed into a first intake port (on the power generation unit) such that the air can be delivered to the cathode (col. 1, lines 47-51; fig. 10). (Although such an intake port is not labeled in fig. 9, it can be seen as the unlabeled rectangles at the end of the stack in fig. 9, wherein these ports are in the same position as the other labeled embodiments; compare to figs. 2-8, wherein for example such ports are labeled in fig. 7, wherein fig. 8 shows the same type of delivery as that of fig. 10. Accordingly, such a first intake port would necessarily exist in the embodiment of fig. 9, or else the reactants would not be able to be delivered to the cells within the stack.) It is noted that such an intake port is located on the second side of the fuel cell (upper half). Fig. 9 shows that there are cooling fans [17] (cooling units) that direct (suck) air to cool the radiation fins [16] (heat radiation unit with heat transfer portion) (fig. 9; col. 12, lines 45-55). It is noted that the upper cooling fan [17] (cooling unit) is located on the second side (upper half of the fuel cell system) and directs the air of the portion of the cooling unit that lies that second side. It can be interpreted that the openings defined by the upper radiation fins [16] constitute a composite second intake port (on the power generation unit, as it is attached to the fuel cell stack [9]), wherein, as such a place is

near that of the first intake port (rectangular unlabeled sections, in fig. 9), that the composite second intake port is adjacent to the first intake port, barring specification as to what constitutes adjacent. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Again, since such a second intake port is on the upper half, it is on a second side of the power generation unit. See annotated figure (fig. 9 of Chizawa et al.) below for interpretation taken:

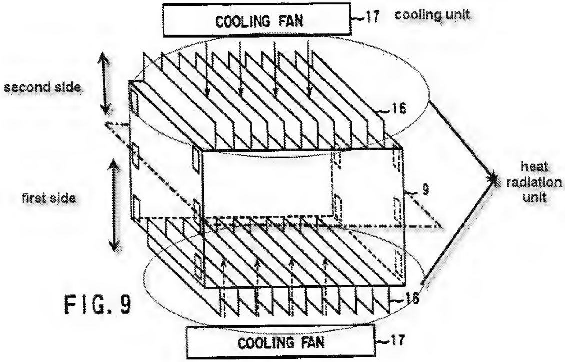

FIG. 9

Chizawa et al. do not teach (a) the specific separator structure and its relation to the heat radiation unit (that it has an upper-side portion including fuel conduits, a lower-side portion including oxidant channels, and a heat transfer portion formed on the lower-side portion and formed in an area corresponding to positions of the fuel conduits and the oxidant gas channels and extending beyond an outer edge of the upper-side portion so as to be formed on surfaces of the radiating fins of said heat radiation unit), (b) the gas flow unit that has the structure such that oxidant gas is sucked, (c) the inclusion of a plurality of temperature detectors (detecting the temperatures in the power generation unit, the heat radiation unit, and the oxidant gas), (d) the inclusion of a humidity detector (detecting the humidity of the oxidant gas), or (e) the specified actions taken based off of the detectors (calculation of the amount of moisture located inside the power generation unit and temperature of the power generation and control of the moisture/temperature in a stable zone by (e1) driving the cooling unit independently from the gas flow unit and (e2) using the gas flow unit to discharge excess moisture).

With respect to (a), Fitts et al. has a heat transfer area [14] (similar to fins [16] of Chizawa et al.) of a heat conducting plate [10] to remove heat (using a fan system); this constitutes a heat radiation connected to a first (right) side of the power generation unit so as to radiate heat from said power generation unit) (figs. 1-7; para 0022; para 0025). There are bipolar plates [78], which serve as separators (fig. 4-7; para 0025). Each bipolar plate (separator) [78] has an upper-side portion having fuel channels [72] (fuel conduits), a lower side portion including oxidant channels (oxidant gas channels), wherein heat conducting plate [10] with heat conductive area [14] can be interpreted to

be part of the lower-side portion, formed in an area corresponding to the positions of the fuel conduits and the oxidant gas channels (as it traverses across them), wherein the heat conducting plate [10] extends past the upper-side portion (figs. 1-7; para 0022; para 0025) (although [10] is unlabeled in fig. 7, its incorporation from earlier plates makes it clear that the heat conductive area [14] is still attached to the heat conducting plate [10]). It is noted that the heat transfer means [14] can be interpreted in such a way a portion of it constitutes the fins of the heat radiation unit (i.e. the right half of heat conducting area [14] fig. 7) as well as the heat transfer portion (the heat conducting plate [10] to the left until the left half that extends past the channel portions) which goes to the heat radiation unit (fig. 7) (similar to the interpretation applied to fins [16] of Chizawa et al.). As the heat transfer portion (defined above) is connected to the fin, it can be interpreted to be formed on the surfaces of the radiating fins, as the surfaces parallel to the stacking direction can be seen to support the left portion of the conductive plate [10] (in the same manner the side of a box would be supported by, and thus be on the top and bottom surfaces of the box), barring specification as to the structure of the heat transfer portion, radiating fins, the surfaces, or the relationship there between. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). The motivation for using the thermal conductivity plate [10] with heat transfer area [14] of Fritts et al. (as applied to the

separator/fins of Chizawa et al., wherein it is noted that Fritts et al. shows an extension of the plate [10] on two sides) is that such an example (as seen in para 0073, which has a larger aluminum section than polymeric/channel section, similar to the plates depicted in figs. 1-7) provides a composite that has good mechanical integrity as well solvent resistance properties (para 0073-0074). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the separator of Fritts et al. in order to provide good mechanical integrity and solvent resistance properties. At the very least, it is noted that the application of such a separator/heat radiation unit combination of Fritts et al. in substitution of that of Chizawa et al. would have provided the predictable result of operating as a separator/heat transfer medium. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the separator/fin of Chizawa et al. with that of Fritts et al., as the substitution of one separator/heat-exchanging structure for another would have yielded the predictable result of behaving in the same manner (to deliver fuel via the separator, and to radiate heat via the heat radiation portion).

With respect to (b), Kaufmann teaches of a fuel cell system wherein specific units for oxidant delivery are set forth, including air delivered by a fan (which would constitute sucking the air in for delivery, as the air must be passed through/sucked through such units for delivery) (para 0016). Accordingly, Kaufmann shows that at the time the claimed invention was made, one of ordinary skill in the art would appreciate specified manners for which reactants (such as oxidant) can be delivered to a fuel cell system,

wherein the use of a known gas feeding system for feeding the reactant (i.e. a fan for delivery of air, as taught by Kaufmann) in another fuel cell system (i.e. the one taught by Chizawa et al.) would have provided the predictable result of operating in the same manner (wherein air would be delivered as an oxidant for fuel cell function). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the air delivery system of Kauffman in the system of Chizawa et al., as the use of a known air delivery unit within a fuel cell system would have provided the predictable result of operating in the same manner (providing air, such that the fuel cell could produce power using the provided reactants).

With respect to (c) and (d), Imamura et al. teach of a similar fuel cell system, wherein water management is the focus (in order to keep the right amount of water in the system) (abs). Specifically, it teaches of having sensors, for example temperature sensors for detecting the temperature of the inlet of the air (oxidant), the temperature of the fuel cell, the outlet temperature of the air as well a humidity sensor in the air inlet, voltage and current sensors to determine the output of the fuel cell, as well as other sensors (not mentioned herein but seen in fig. 1) (para 0028; fig. 1). It is further noted that all of the sensors as well as the compressor [2] (which is linked to air distribution) are linked a controller (fig. 1; para 0029). Furthermore it is noted that the humidity in the air outlet is stream can be calculated via the controller (para 0063-0064). (Note this is taken to be indicative of the amount of water in the fuel cell/power generation unit, as it has come from inside the system.) The motivation for employing the system of controls and sensors (part of the detection unit) as taught by Imamura et al. to the system of

Chizawa et al. is in order to accurately calculate the water content of the fuel cell in order that the water content can be adjusted properly (para 0006-0007; claim 14; claim 12). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to employ the control system of Imamura et al to that of Chizawa et al. in order to impart a good control system to ensure an appropriate amount of water is available within the fuel cell for good operation.

With respect to (e),

(e1) It is first noted that fans of Chizawa et al. are necessarily driven independently from the gas flow unit, as the reactants are line to the fuel cells (as state within col. 5, lines 5-10), and fig. 9 shows that the fans are directed to the stack externally (via the arrows).) However, Chizawa et al. does not specifically show that such a heat transfer gas is hooked up to a controller (in order to be able to control the operating temperature to an appropriate range.) However, Leboe et al. provide the general teaching that heat transfer gas should be controlled to maintain the components [of a fuel cell] within preferred operating temperature ranges (para 0012). Accordingly, there is motivation to control the amount of cooling with respect to the temperature of the system components - to keep the system within preferred operating temperature ranges. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use a controller to control the cooling fan of Chizawa et al. in conjunction with the temperature (another part of the detection unit) of the fuel cell system in order to maintain good operational temperature of the system (as taught by Leboe et al.)

(e2) Wells et al. teach a fuel cell system, wherein there is an air compressor [78] hooked up to a controller [CS1] that controls the air to a desired air flow (fig. 3; para 0048). Furthermore, it is taught that flooding must not occur, wherein increased oxidant flow rate is one way to remove water buildup (para 0080). The motivation for using increased air flow to remove excess water is to prevent flooding. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to have a controller control the air flow delivered in order to prevent flooding.

With respect to (e1), (e2), and the actions in general (with respect to the calculating and detecting), the combination above would render such limitations obvious. As set forth above (for example in (c), (d), (e1), and (e2)), the connection of all of the temperature and humidity sensors as well as flow control of both the oxidant reactant and coolant, as linked to a controller has been rendered obvious. Therefore at the very least, the obviated structure would be capable of operating in the prescribed manner (as it is structurally the same as the claimed invention – i.e. has all of the same elements hooked up to a controller).

It has been held that the recitation of an element is “capable” of performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson,* 69 USPQ 138.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in <u>apparatus</u>, article, and composition claims, <u>intended use must result in a structural difference between the claimed invention and the prior art</u>

in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

As to claim 43, Chizawa et al. teach of a plurality of laminated fuel cells [6], wherein a each cell [4] (joint body) has electrodes (anode [1a] and cathode [1b]) with an ion conducting polymer electrolyte [3] in between the electrodes, as well as separators [5] that clamp either side (fig. 1; col. 1, lines 30-47).

As to claim 44, the ion conducting electrolyte as taught by Chizawa et al. is inherently proton conducting.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but

the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that the fuel embodied is hydrogen (col. 1, lines 48-49), wherein the only cation available via the electrochemical reaction using this fuel is a proton. Thus, the proton must be an ion that is conducted through an electrolyte (or else no electric power can be generated). This is also supported by col. 16, lines 15-20 and 29-32, which speak of having protons within the system, wherein the protons are transported.

The Examiner invites applicant to provide that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596

(CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

As to claim 47, Chizawa et al., the fuel cells [4] (joint bodies) are placed in a stack and are laminated with a separator being interposed between fuel cells [4] (fig. 1; col. 1, lines 57-63).

As to claim 48, Chizawa et al. teach that fuel to the anode [1a] in a planar manner (fig. 10) (and thus must have an in-plane conduit for delivery in the manner seen in fig. 10). Since it is also stated that the reactants are fed via two different lines to the separator (col. 5, lines 4-10), the fuel must be fed to a place wherein the joint body and separator contact one another.

As to claim 49, Chizawa et al. teach that general fuel cells must have separators with grooves that feed reactive gases to each of the electrodes (thus indicative of a supply hole) (col. 1, lines 43-47). Additionally, in the first embodiment, it is indicated that in addition to un-reacted gas [101] being fed to the system, reacted gas [101] is taken out of the system (thus indicating some sort of discharge hole that is present), wherein both cathode and anode reactant gas is embodied (fig. 2A; col. 8, lines 56-65). Furthermore, exploded form of joint body in fig. 7, is relied upon to show the basics of fuel cell geometry (with respect to wherein it is specifically noted that the composite separator would include the bipolar version of the separator plate (oxidant and fuel flow sides together, as would be present in a stack). The path for the anode flow is denoted by [13a] and goes from one opening to another.

As to claim 50, it is noted that Chizawa et al. teach a plurality of fuel cells within a fuel cell stack [9], wherein it is indicated that the supply holes and discharge holes of the plurality of separators line up with one another to create supply passages and discharge passages, respectively (see fig. 1, fig. 2A, fig. 2B, and fig. 7 to see the embodiment of a stack and how the conduits line up).

As to claims 51 and 52, it is again noted Chizawa et al. teach that fuel cells have grooves for feeding reactant through the separator (col. 1, lines 43-47). Fig. 5 shows the embodiment of an exploded fuel cell, wherein dotted line [13a] represents anode flow. As can be seen in fig. 5, the flow from one manifold to the other (one being the supply passage hole and the other being the discharge passage hole) is represented by a singular flow line, wherein the flow traverses over the length of the plate. In such a manner, the sectional area of the connecting means can be interpreted as the portion that leaves the manifold, and the sectional area of the in-plane conduit can be interpreted to be the entire length of the flow (from one manifold to the other). In such a manner, the connecting portion of the supply and discharge portion is smaller than that of the conduit (as the connecting portion cannot be larger than the supply or discharge manifold and the conduit traverses the length of the cell from one manifold to the other) (as applied to claims 51 and 52) (fig. 5).

As to claim 56, Chizawa et al. teach of radiation fins [16] (heat radiation unit) and cooling fans [17] (upper cooling fan included) which work in conjunction to cool the stack (col. 12, lines 56-60). Therefore some stagnating must occur in proximity to the fins, or else cooling would not occur (barring specification as to what specifically

constitutes stagnating). Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Furthermore, at the very least, the fans would be capable of being operated in such a manner, as the structure is the same as that claimed. Please see the rejection to claim 42 for the Office's position on "capable of" as applied to apparatus claims.

As to claim 60, the combination of Chizawa et al., Fitts et al., Kaufmann, Imamura et al., Wells et al., and Leboe et al. renders such a claim limitation obvious. It is noted that the combination set forth above has rendered obvious the use of humidity and temperature sensors (environmental conditions), as read by a controller, wherein such a controller controls a cooling unit as well as air flow. Accordingly, it is submitted that the combination is at the very least capable of functioning in the same manner, as it is structurally the same as the claimed invention. Please see the rejection to claim 42 for the Office's position on "capable of" as applied to apparatus claims.

As to claim 61, the combination of Chizawa et al., Fitts et al., Kaufmann, Imamura et al., Wells et al., and Leboe et al. renders such a claim limitation obvious. As set forth above, Leboe et al. renders obvious connecting cooling unit to a controller (see para 0012). Imamura et al. renders obvious connecting the environmental condition sensors (temperature and humidity), voltage/amp sensors (to measure output of the fuel cell), as well as an air flow unit (compressor [2]) to the controller (see fig. 1),

wherein Imamura et al. specifically teaches of the capability of calculating the amount of water in the system (para 0007). Accordingly, the combination renders obvious the same structure as claimed by the instant application. Thus, the combination would at the very least be capable of operating in the claimed manner (controlling the gas flow unit and cooling unit according to the amount of water remaining in the power generation unit, which is calculated based on the environmental condition and the quantity of electric power generated by the power generation unit). Please see the rejection to claim 42 for the Office's position on "capable of" as applied to apparatus claims.

As to claim 62, as stated before, Chizawa et al. teach that both reactive gases (thus fuel) are supplied to their respective electrodes via separate lines, which causes reaction with the oxidant (col. 5, lines 5-10; col. 1, lines 47-52). The flowing of such a gas is indicative that it comes from some sort of a unit, and thus it is inherent that a fuel storage unit inherently exists. The basis for inherency is that if hydrogen is flowed to the fuel cell, it must come from some sort of storage unit or else it would not be able to be supplied. Please see the rejection of claim 44 for the Office's policy on inherency. Furthermore, at the very least, the line that delivers the fuel can be interpreted to be a storage unit, as it does store the fuel momentarily prior to deliver. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322

(Fed. Cir. 1989). Lastly it is noted that this supplying happens while the fuel cell is being active with the reaction (taken to be when the power generation unit is being driven).

As to claim 87, the combination renders such a limitation obvious, as Fitts et al., relied upon to teach the separator/conduction area (fin, heat transfer portion) teaches that the thermal conductivity of the plate [10] (part of the conduction area) is much greater than that of material [12] (that of the polymeric composite used), wherein in one embodiment, the material used to make the channels of the bipolar plate is the same as that of material [12] (para 0022-0025; figs. 1-7). Again reasons for obviousness of the combination with Fitts et al. (to produce the structure of the separator/conducting region) are reiterated for clarity's sake: "The motivation for using the thermal conductivity plate [10] with heat transfer area [14] of Fritts et al. (as applied to the separator/fins of Chizawa et al., wherein it is noted that Fritts et al. shows an extension of the plate [10] on two sides) is that such an example (as seen in para 0073, which has a larger aluminum section than polymeric/channel section, similar to the plates depicted in figs. 1-7) provides a composite that has good mechanical integrity as well solvent resistance properties (para 0073-0074). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the separator of Fritts et al. in order to provide good mechanical integrity and solvent resistance properties. At the very least, it is noted that the application of such a separator/heat radiation unit combination of Fritts et al. in substitution of that of Chizawa et al. would have provided the predictable result of operating as a separator/heat

transfer medium. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the separator/fin of Chizawa et al. with that of Fritts et al., as the substitution of one separator/heat-exchanging structure for another would have yielded the predictable result of behaving in the same manner (to deliver fuel via the separator, and to radiate heat via the heat radiation portion)."

4. Claims 46, 54, and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chizawa et al. in view of Fitts et al., Kaufmann, Imamura et al., Wells et al., and Leboe et al., as applied to claims 42, 43, 47, and 48 above, and further in view of US 6277508 (Reiser et al.).

As to claim 46, the combination of Chizawa et al., Fitts et al., Kaufmann, Imamura et al., Wells et al., and Leboe et al. does not teach of having water suction unit that suctions and removes water from the conduit.

However, Reiser et al. teach of a similar fuel cell system, wherein a hydrophilic separator plate is inserted in between the anode and cathode flow field (see fig. 1; col. 4, lines 54-60). The motivation for doing so would be direct water from the cathode flow field to the anode flow field, thus providing humidification to the anode flow field (col. 4, lines 61-64). This in turn would help manage the water content of the cathode flow field and would help prevent flooding (col. 4, lines 8-10). (Note the hydrophilic separator plate serves as suction unit, as it sucks water from the cathode side, and thus the cathode conduit, and removes it to the anode side.) Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was

made to include a hydrophilic separator plate the cathode and anode flow field portions in order to help humidify the anode and in order to help properly manage water on the cathode side to prevent flooding.

As to claims 54 and 55, Chizawa et al. do not teach of a water discharge unit configured to discharge water from an in-plane conduit (anode side) via pressure difference of the supply and discharge side (as required by claim 54), wherein the unit opens a part of the discharge passage to the atmosphere to create such a pressure difference (as required by claim 55).

Reiser et al. teach of a similar fuel cell wherein different water management systems are embodied. Reiser et al.'s embodies an external system (similar to that of Chizawa et al.'s) wherein the water from the cathode reactant exhaust is used to humidify the fuel reactant (col. 4, lines 8-18). However, Reiser et al. describe an the use of an internal water recovery system, wherein such a system is understood by one of ordinary skill in the art and that one or a combination of the different subsystems can be used (col. 4, lines 23-28). Specifically, Reiser et al. embody the use of a water management system that is internal (wherein a hydrophilic separator helps bring water from the cathode side to the anode side for proper humidification (col. 4, lines 54-64). Such a system has an anode recycling loop for better water management and an exhaust valve [67] which controls the ratio of what portion of the anode exhaust is recycled and what portion is exhausted from the system (thus to the atmosphere (as applied to claim 55)) (fig. 1; col. 5, lines 32-34 and 47-49). It is noted that the internal water management with an anode exhaust valve [67] is the unit for discharging water

from the system (as applied to claims 54), wherein it is inherent that such discharging is caused by a pressure differential within the supply and discharge passage of the anode side (as applied to claims 54-55). The basis for inherency is that the system, as described above, would not function if this were not the case (as the exhaust would not discharge from the exhaust valve if there was no force applied to the system (pressure differential between the supply and discharge passage) and would thus be stagnant). Furthermore, it is noted that this is the same structure embodied Applicant (fig. 1; hydrogen purge valve [54]), and thus would work in the same manner. Please see the rejection of claim 44 for the Office's policy on inherency incorporated herein but not reiterated for brevity's sake. It is noted that the exhausting of the used reactant from the hydrogen side would result in any excess water being discharged as well, as it is in the exhaust (as applied to claim 55). The motivation for using the internal system, as embodied by Reiser et al. (with the specified discharging unit) is that the use of such a system would improve the water management of a fuel cell system. At the very least, one of ordinary skill in the art would have the substitution of internal water management system of Reiser et al. for the external system as embodied by Chizawa et al. obvious, as such a substitution would have yielded the predicable result of operating in the same manner (as a humidification/water management system). Raiser et al. specifically supports this view by teaching that known water management systems (including internal ones) are known in the art and be obvious to one of ordinary skill in the art to use any one or subcombination of such water management systems (col. 4, lines 23-28). Therefore it would have been obvious to one having ordinary skill in the art at the

time the claimed invention was made to use the internal system of Reiser et al. with the external system of Chizawa et al. in order to improve water management or to replace the external system of Chizawa et al. with that of Reiser et al., as such a substitution would yield the predictable result of having a working water management system that provides proper humidification.

5. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chizawa et al. in view of Fitts et al., Kaufmann, Imamura et al., Wells et al., and Leboe et al., as applied to claims 42, 43, 47, and 48 above, in further view of US 2001/0019793 (Tsuyoshi).

As to claim 53, the combination of Chizawa et al., Fitts et al., Kaufmann, Imamura et al., Wells et al., and Leboe et al. does not teach that he connecting portion to the supply passage is smaller than the connecting portion to the discharge passage.

However, Tsuyoshi teaches a fuel cell with a collector plate (flow plate that allows for flow of reacting gases) (para 0007). Specifically, Tsuyoshi teaches that the supply hole (and thus the portion connecting to it) should be smaller than that of the discharge hole (and thus the connection portion to it) (para 0011). The fuel supply hole [71] is smaller than fuel discharge hole [72] (wherein although not particularly shown for the fuel, other flow connecting portions are shown are the same sizes as the hole that it corresponds to and would be expected to be the case for the fuel as well, as indicated by fig. 1) (fig. 1; para 0036). The motivation for doing so is that water content in the gas passages can be discharged efficiently (para 0057, lines 12-16). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed

invention was made to employ the use of larger discharge hole for fuel exhaust (and thus connection portion to such a passage) as taught by Tsuyoshi in order to provide better water discharging characteristics of the cell.

6. Claims 63, 81, and 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chizawa et al. in view of Fitts et al. Kaufmann, Imamura et al., Wells et al., and Leboe et al., as applied to claim 42 above, in further view of US 2002/0051898 (Moulthrop, Jr. et al.).

As to claim 63, the combination of Chizawa et al., Fitts et al. Kaufmann, Imamura et al., Wells et al., and Leboe et al. does not teach having a pressure control unit of the fuel supplied to the fuel cell (power generation unit).

However, Moulthrop, Jr. et al. teach of a fuel cell/electrolysis system, wherein the fuel cell operation version is similar to that of Chizawa et al. (proton using, see para 0003 of Moulthrop, Jr. et al.). It is specifically noted that Moulthrop, Jr. et al. teach of including a pressure regulator [68], which is placed on the hydrogen feed to the fuel cell system (para 0046; fig. 2). The motivation for providing a pressure regulator on the hydrogen inlet stream, as taught by Moulthrop, Jr. et al. is so that the fuel is provided at optimal operating pressure during fuel cell operation (para 0046; fig. 2). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to include a pressure regulator on the hydrogen gas inlet in order to help keep the fuel cell system at its optimal operating pressure (and thus optimal conditions for optimal operation).

As to claim 81, Chizawa et al. teach of a general fuel cell system, which has a plurality of fuel cells [4] which react electrochemically to create power (power generation units) (col. 1, lines 30-43; fig. 1). It is stated that oxygen is fed to the system (and thus some conduit containing oxygen gas must exist) (col. 1, lines 48-51). It is specifically noted that Chizawa et al. embodies such a typical fuel cell with modifications, as there is a statement as to only differences to the general fuel cell of fig. 1 will be described in their embodiments (col. 2, lines 26-28). In one particular embodiment radiation fins [16], for radiating heat to the outer atmosphere (heat radiation unit with a plurality of radiating fins and having heat transfer portions) is embodied (col. 5, lines 5-10; col. 12, lines 55-59; fig. 9). Although not specifically shown in fig. 9, Chizawa et al. teach that the cooling unit via radiating (i.e. radiating fins of fig. 9) are provided with the separator (of the fuel cell) (col. 5, lines 4-10). Accordingly, it can be interpreted that separator and cooling unit via radiating are in some manner integral, wherein a half of the fin (further away from the fuel cell portion) can be interpreted to be a heat radiation unit and half of the fin (closer to the fuel cell portion) can be interpreted to be a heat transfer portion that extends to a heat radiation unit (barring specification of there relationship between the heat radiation unit and heat transfer portion). The fins [16] below the stack [9] are interpreted to be connected to a first side (lower half of the fuel cell system), while the fins [16] above the stack [9] are on a second side (upper half of the fuel cell system). It is noted that the system has gas-feeding means (gas flow unit) for the reactants (thus encompassing both oxidant and fuel), wherein the gas-feeding means feeds each reactant separately into the separator (col. 5, lines 5-10). It is noted that the oxidant gas

(air embodied) is necessarily fed into a first intake port (on the power generation unit) such that the air can be delivered to the cathode (col. 1, lines 47-51; fig. 10). (Although such an intake port is not labeled in fig. 9, it can be seen as the unlabeled rectangles at the end of the stack in fig. 9, wherein these ports are in the same position as the other labeled embodiments; compare to figs. 2-8, wherein for example such ports are labeled in fig. 7, wherein fig. 8 shows the same type of delivery as that of fig. 10. Accordingly, such a first intake port would necessarily exist in the embodiment of fig. 9, or else the reactants would not be able to be delivered to the cells within the stack.) It is noted that such an intake port is located on the second side of the fuel cell (upper half). Fig. 9 shows that there are cooling fans [17] (cooling units) that direct (suck) air to cool the radiation fins [16] (heat radiation unit with heat transfer portion) (fig. 9; col. 12, lines 45-55). It is noted that the upper cooling fan [17] (cooling unit) is located on the second side (upper half of the fuel cell system) and directs the air of the portion of the cooling unit that lies that second side. It can be interpreted that the openings defined by the upper radiation fins [16] constitute a composite second intake port (on the power generation unit, as it is attached to the fuel cell stack [9]), wherein, as such a place is near that of the first intake port (rectangular unlabeled sections, in fig. 9), that the composite second intake port is adjacent to the first intake port, barring specification as to what constitutes adjacent. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re*

Zletz, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Again, since such a second intake port is on the upper half, it is on a second side of the power generation unit. See annotated figure (fig. 9 of Chizawa et al.) below for interpretation taken:

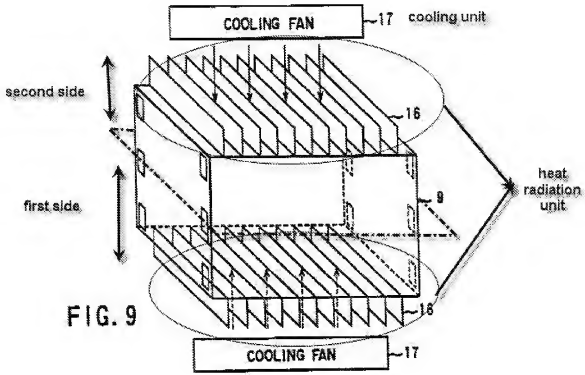

FIG. 9

Chizawa et al. do not teach (a) the specific separator structure and its relation to the heat radiation unit (that it has an upper-side portion including fuel conduits, a lower-side portion including oxidant channels, and a heat transfer portion formed on the lower-side portion and formed in an area corresponding to positions of the fuel conduits and the oxidant gas channels and extending beyond an outer edge of the upper-side portion so as to be formed on surfaces of the radiating fins of said heat radiation unit), (b) the gas flow unit that has the structure such that oxidant gas is sucked, (c) the inclusion of a

plurality of temperature detectors (detecting the temperatures in the power generation unit, the heat radiation unit, and the oxidant gas), (d) the inclusion of a humidity detector (detecting the humidity of the oxidant gas), (e) the specified actions taken based off of the detectors (calculation of the amount of moisture located inside the power generation unit and temperature of the power generation and control of the moisture/temperature in a stable zone by (e1) driving the cooling unit independently from the gas flow unit and (e2) using the gas flow unit to discharge excess moisture), or (f) the fuel cell is used with an electronic apparatus.

With respect to (a), Fitts et al. has a heat transfer area [14] (similar to fins [16] of Chizawa et al.) of a heat conducting plate [10] to remove heat (using a fan system); this constitutes a heat radiation connected to a first (right) side of the power generation unit so as to radiate heat from said power generation unit) (figs. 1-7; para 0022; para 0025). There are bipolar plates [78], which serve as separators (fig. 4-7; para 0025). Each bipolar plate (separator) [78] has an upper-side portion having fuel channels [72] (fuel conduits), a lower side portion including oxidant channels (oxidant gas channels), wherein heat conducting plate [10] with heat conductive area [14] can be interpreted to be part of the lower-side portion, formed in an area corresponding to the positions of the fuel conduits and the oxidant gas channels (as it traverses across them), wherein the heat conducting plate [10] extends past the upper-side portion (figs. 1-7; para 0022; para 0025) (although [10] is unlabeled in fig. 7, its incorporation from earlier plates makes it clear that the heat conductive area [14] is still attached to the heat conducting plate [10]). It is noted that the heat transfer means [14] can be interpreted in such a

way a portion of it constitutes the fins of the heat radiation unit (i.e. the right half of heat conducting area [14] fig. 7) as well as the heat transfer portion (the heat conducting plate [10] to the left until the left half that extends past the channel portions) which goes to the heat radiation unit (fig. 7) (similar to the interpretation applied to fins [16] of Chizawa et al.). As the heat transfer portion (defined above) is connected to the fin, it can be interpreted to be formed on the surfaces of the radiating fins, as the surfaces parallel to the stacking direction can be seen to support the left portion of the conductive plate [10] (in the same manner the side of a box would be supported by, and thus be on the top and bottom surfaces of the box), barring specification as to the structure of the heat transfer portion, radiating fins, the surfaces, or the relationship there between. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). The motivation for using the thermal conductivity plate [10] with heat transfer area [14] of Fritts et al. (as applied to the separator/fins of Chizawa et al., wherein it is noted that Fritts et al. shows an extension of the plate [10] on two sides) is that such an example (as seen in para 0073, which has a larger aluminum section than polymeric/channel section, similar to the plates depicted in figs. 1-7) provides a composite that has good mechanical integrity as well solvent resistance properties (para 0073-0074). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the

separator of Fritts et al. in order to provide good mechanical integrity and solvent resistance properties. At the very least, it is noted that the application of such a separator/heat radiation unit combination of Fritts et al. in substitution of that of Chizawa et al. would have provided the predictable result of operating as a separator/heat transfer medium. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the separator/fin of Chizawa et al. with that of Fritts et al., as the substitution of one separator/heat-exchanging structure for another would have yielded the predictable result of behaving in the same manner (to deliver fuel via the separator, and to radiate heat via the heat radiation portion).

With respect to (b), Kaufmann teaches of a fuel cell system wherein specific units for oxidant delivery are set forth, including air delivered by a fan (which would constitute sucking the air in for delivery, as the air must be passed through/sucked through such units for delivery) (para 0016). Accordingly, Kaufmann shows that at the time the claimed invention was made, one of ordinary skill in the art would appreciate specified manners for which reactants (such as oxidant) can be delivered to a fuel cell system, wherein the use of a known gas feeding system for feeding the reactant (i.e. a fan for delivery of air, as taught by Kaufmann) in another fuel cell system (i.e. the one taught by Chizawa et al.) would have provided the predictable result of operating in the same manner (wherein air would be delivered as an oxidant for fuel cell function). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the air delivery system of Kauffman in the system of

Chizawa et al., as the use of a known air delivery unit within a fuel cell system would have provided the predictable result of operating in the same manner (providing air, such that the fuel cell could produce power using the provided reactants).

With respect to (c) and (d), Imamura et al. teach of a similar fuel cell system, wherein water management is the focus (in order to keep the right amount of water in the system) (abs). Specifically, it teaches of having sensors, for example temperature sensors for detecting the temperature of the inlet of the air (oxidant), the temperature of the fuel cell, the outlet temperature of the air as well a humidity sensor in the air inlet, voltage and current sensors to determine the output of the fuel cell, as well as other sensors (not mentioned herein but seen in fig. 1) (para 0028; fig. 1). It is further noted that all of the sensors as well as the compressor [2] (which is linked to air distribution) are linked a controller (fig. 1; para 0029). Furthermore it is noted that the humidity in the air outlet is stream can be calculated via the controller (para 0063-0064). (Note this is taken to be indicative of the amount of water in the fuel cell/power generation unit, as it has come from inside the system.) The motivation for employing the system of controls and sensors (part of the detection unit) as taught by Imamura et al. to the system of Chizawa et al. is in order to accurately calculate the water content of the fuel cell in order that the water content can be adjusted properly (para 0006-0007; claim 14; claim 12). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to employ the control system of Imamura et al to that of Chizawa et al. in order to impart a good control system to ensure an appropriate amount of water is available within the fuel cell for good operation.

With respect to (e),

(e1) It is first noted that fans of Chizawa et al. are necessarily driven independently from the gas flow unit, as the reactants are line to the fuel cells (as state within col. 5, lines 5-10), and fig. 9 shows that the fans are directed to the stack externally (via the arrows).) However, Chizawa et al. does not specifically show that such a heat transfer gas is hooked up to a controller (in order to be able to control the operating temperature to an appropriate range.) However, Leboe et al. provide the general teaching that heat transfer gas should be controlled to maintain the components [of a fuel cell] within preferred operating temperature ranges (para 0012). Accordingly, there is motivation to control the amount of cooling with respect to the temperature of the system components - to keep the system within preferred operating temperature ranges. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use a controller to control the cooling fan of Chizawa et al. in conjunction with the temperature (another part of the detection unit) of the fuel cell system in order to maintain good operational temperature of the system (as taught by Leboe et al.)

(e2) Wells et al. teach a fuel cell system, wherein there is an air compressor [78] hooked up to a controller [CS1] that controls the air to a desired air flow (fig. 3; para 0048). Furthermore, it is taught that flooding must not occur, wherein increased oxidant flow rate is one way to remove water buildup (para 0080). The motivation for using increased air flow to remove excess water is to prevent flooding. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed

invention was made to have a controller control the air flow delivered in order to prevent flooding.

With respect to (e1), (e2), and the actions in general (with respect to the calculating and detecting), the combination above would render such limitations obvious. As set forth above (for example in (c), (d), (e1), and (e2)), the connection of all of the temperature and humidity sensors as well as flow control of both the oxidant reactant and coolant, as linked to a controller has been rendered obvious. Therefore at the very least, the obviated structure would be capable of operating in the prescribed manner (as it is structurally the same as the claimed invention – i.e. has all of the same elements hooked up to a controller).

It has been held that the recitation of an element is "capable" of performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson,* 69 USPQ 138.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in <u>apparatus</u>, article, and composition claims, <u>intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.</u> In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

With respect to (f), Moulthrop, Jr. et al. show that the electricity (electric potential) generated during fuel cell operation is used to power an external load (electronic apparatus) (para 0005). Accordingly, the motivation for using the fuel cell system of Chizawa et al. in conjunction in a load would be use the electric potential created and not to waste it. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the apparatus of Chizawa et al. in conjunction with a load in order to use the electricity generated and to not waste energy.

As to claim 88, the combination renders such a limitation obvious, as Fitts et al., relied upon to teach the separator/conduction area (fin, heat transfer portion) teaches that the thermal conductivity of the plate [10] (part of the conduction area) is much greater than that of material [12] (that of the polymeric composite used), wherein in one embodiment, the material used to make the channels of the bipolar plate is the same as

that of material [12] (para 0022-0025; figs. 1-7). Again reasons for obviousness of the combination with Fitts et al. (to produce the structure of the separator/conducting region) are reiterated for clarity's sake: "The motivation for using the thermal conductivity plate [10] with heat transfer area [14] of Fritts et al. (as applied to the separator/fins of Chizawa et al., wherein it is noted that Fritts et al. shows an extension of the plate [10] on two sides) is that such an example (as seen in para 0073, which has a larger aluminum section than polymeric/channel section, similar to the plates depicted in figs. 1-7) provides a composite that has good mechanical integrity as well solvent resistance properties (para 0073-0074). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the separator of Fritts et al. in order to provide good mechanical integrity and solvent resistance properties. At the very least, it is noted that the application of such a separator/heat radiation unit combination of Fritts et al. in substitution of that of Chizawa et al. would have provided the predictable result of operating as a separator/heat transfer medium. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the separator/fin of Chizawa et al. with that of Fritts et al., as the substitution of one separator/heat-exchanging structure for another would have yielded the predictable result of behaving in the same manner (to deliver fuel via the separator, and to radiate heat via the heat radiation portion)."

7. Claims 83-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chizawa et al. in view of Fitts et al., Kaufmann, Imamura et al., Wells et al., and Leboe

et al., as applied to claim 42, either as evidenced by or in further view of WO 01/54218 (Koschany).

As to claim 83, figs. 9 and 2B of Chizawa et al. are relied upon. Fig. 2B shows that the cathode gas inlet is 15c (upper left hand corner), while the cathode outlet is 15d (lower right hand corner). (Although not labeled, these portions correspond to that of fig. 9.) Accordingly, the intake side can be interpreted to be the same as the second side (upper half of the fuel cell), while the right side can be interpreted to be the exhaust side. In such a manner, the cooling unit (upper fan [17]) and oxidant gas unit are provided on the intake side. It is clear that the cathode outlet (as describe above) exists at the right hand side (constituting an exhaust side).

At this point Koschany is relied upon to show that the air from the upper fan [17] would either (a) inherently head towards the right-hand (exhaust) side or (b) why such a trending towards that direction (right-hand exhaust side) would be obvious. (See the rejection to claim 43 for the Office's position as to inherent characteristics. Such a position is not reiterated herein for brevity's sake.)

With respect to (a), fig. 3 of Koschany shows that when an air stream is directed towards the center of a portion, air flows to both the left and right (thus some air would flow towards the right hand side, as applied to Chizawa et al., wherein the right hand side is the exhaust side).

With respect to (b): Alternately, if it is shown that air directed towards the center of a fin portion does not travel in both directions, such a direction of flow would have been obvious. Koschany teaches that by dividing the flow of cooling air in at least two

directions, traversing of a long pathway and the reducing of pressure drop can be achieved (fig. 3; p 10, line 26-p 11, line 12). The motivation to include such a cooling air flow (towards both left and right hand sides, which encompasses the exhaust side) is in order to provide cooling wherein the pressure drop is reduced. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to apply Koschany's direction cooling to the teaching of Chizawa et al. in order to provide good cooling while keeping pressure drop of a system low.

As to claim 84, the combination renders such a claim limitation obvious, as Chizawa et al.'s system has oxidant fed into [15c] as well as upper cooling fan [17]. In such a manner, at least a portion of the gas flow unit and cooling fan [17] are on the intake side (upper side) (as at least a portion of both must be located on the upper portion of the fuel cell system, as both are fed to that portion; see fig. 2B and fig. 9).

8. Claims 85-86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chizawa et al. in view of Fitts et al., Kaufmann, Imamura et al., Wells et al., Leboe et al., and Moulthrop, Jr. et al., as applied to claim 81, either as evidenced by or in further view of Koschany.

As to claim 85, figs. 9 and 2B of Chizawa et al. are relied upon. Fig. 2B shows that the cathode gas inlet is 15c (upper left hand corner), while the cathode outlet is 15d (lower right hand corner). (Although not labeled, these portions correspond to that of fig. 9.) Accordingly, the intake side can be interpreted to be the same as the second side (upper half of the fuel cell), while the right side can be interpreted to be the exhaust side. In such a manner, the cooling unit (upper fan [17]) and oxidant gas unit are

provided on the intake side. It is clear that the cathode outlet (as describe above) exists at the right hand side (constituting an exhaust side).

At this point Koschany is relied upon to show that the air from the upper fan [17] would either (a) inherently head towards the right-hand (exhaust) side or (b) why such a trending towards that direction (right-hand exhaust side) would be obvious. (See the rejection to claim 43 for the Office's position as to inherent characteristics. Such a position is not reiterated herein for brevity's sake.)

With respect to (a), fig. 3 of Koschany shows that when an air stream is directed towards the center of a portion, air flows to both the left and right (thus some air would flow towards the right hand side, as applied to Chizawa et al., wherein the right hand side is the exhaust side).

With respect to (b): Alternately, if it is shown that air directed towards the center of a fin portion does not travel in both directions, such a direction of flow would have been obvious. Koschany teaches that by dividing the flow of cooling air in at least two directions, traversing of a long pathway and the reducing of pressure drop can be achieved (fig. 3; p 10, line 26-p 11, line 12). The motivation to include such a cooling air flow (towards both left and right hand sides, which encompasses the exhaust side) is in order to provide cooling wherein the pressure drop is reduced. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to apply Koschany's direction cooling to the teaching of Chizawa et al. in order to provide good cooling while keeping pressure drop of a system low.

As to claim 86, the combination renders such a claim limitation obvious, as Chizawa et al.'s system has oxidant fed into [15c] as well as upper cooling fan [17]. In such a manner, at least a portion of the gas flow unit and cooling fan [17] are on the intake side (upper side) (as at least a portion of both must be located on the upper portion of the fuel cell system, as both are fed to that portion; see fig. 2B and fig. 9).

Response to Arguments

9. Applicant's arguments filed May 24, 2011 have been fully considered but they are not persuasive.

Applicant argues that the amendments to claims 42 and 81 overcome the rejections, specifically that the heat conductive area of Fitts [14] is a single layer and does not have a heat transfer portion formed on a surface thereon, wherein it would not be obvious to add an additional layer, as Fitts et al. teach of having portion [14] of conducting plate [10] uncovered.

Examiner respectfully disagrees and submits that Applicant is reading the claim language too narrowly. The heat conducting plate [10] is interpreted to be both the fins of the heat radiation unit (the right half of heat conducting area [14] fig. 7) as well as the heat transfer portion (the heat conducting plate [10] to the left until the left half that extends past the channel portions). Accordingly, as the heat transfer portion is connected to the fin, it can be interpreted to be formed on the surfaces of the radiating fins, as the surfaces parallel to the stacking direction can be seen to support the left portion of the conductive plate [10] (in the same manner the side of a box would be supported by, and thus be on the top and bottom surfaces of the box), barring

specification as to the structure of the heat transfer portion, radiating fins, the surfaces, or the relationship there between. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Additionally, it is noted that the claim language does not specify the structure of the fins/heat transfer portion in relation to one another – i.e. there is no requirement that they be separate, discreet layers. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., having more than one single layer) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Lastly, it is noted that there is no combination as to add a separate layer to Fitts at this point, so such an argument is irrelevant. Thus such arguments are not found to be persuasive, and the rejection of record is maintained.

With respect to the arguments regarding the 103 rejections, Applicant argues that the prior art used render obvious the rejected claims (Reiser, Tsuyoshi, Multhrop, Koschany) do not cure the deficiencies of the references applied to the independent claims (Chizawa, Fitts, Kaufmann, Imamura, Wells, Leboe). Applicant does not argue how the combination is not proper. Therefore, the Examiner maintains the obviousness rejections and upholds the rejection as to the independent claim, as above.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on a flex schedule, generally 6 - 3:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1726

/Gregg Cantelmo/
Primary Examiner, Art Unit 1726